REMARKS/ARGUMENTS

Reconsideration of the present application, as amended, is respectfully requested.

The December 15, 2005 Office Action and the Examiner's comments have been carefully considered. In response, the claims 1, 4 and 5 are amended, claim 3 is cancelled, new claim 18 was added (all features of new claim 18 was presented previously in claim 15) and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

The Applicant will respond on the Examiner's numbered remarks posted in the Detailed Action by assigning consequent number to so called "Point # ".

Point 10.There is erroneously mentioned by the Examiner reference when claim 6 called claim 5.

Applicants believe that the following remarks address and overcome all of the Examiner's objections and rejections.

ELECTION

Applicants hereby elect Claims 1-6 and new claim 18 for further prosecution on the merits.

Point 2. Inventors disagree with the Examiner's position that (1) "process as claimed can be practiced by another materially different apparatus ***or by hand***, or (2) "apparatus as claimed can be used to practice another and materially different process". Although the Examiner asserts: "In this case the apparatus could be used to carry out hydrogenation reaction".

In our opinion process, as claimed, can be efficiently practiced only by claimed method having the claimed features of designed electrode system in the proposed apparatus claims. We cannot understand the Examiner suggestion that process as claimed can be practiced by ***hand.*** The proposed method is carrying out in automatically controlled plasma reactor having power, vacuum, gas, water supply systems and strong proportionality between injected outflow rate and consumable electrode evaporation rate.

Another Examiner's assertion is questionable because the invented apparatus can only process a solid precursors where injected gaseous materials are used for technological purpose only.

Point 5. The inventorship is not amended of the remaining in the application claims.

Point 7, 8, 9. Claims 4 and 5 have been amended to better comply with the requirements of 35 USC 112 and to more clearly recite the distinguishing features of the present invention. The informalities pointed out by the Examiner have all been corrected. Proper antecedent basis has been provided for all claimed elements, and all claimed elements and the structural relationships

therebetween have been more positively and more clearly recited. It is respectfully submitted that no new matter has been added and amended claims 1, 4 and 5 are in full compliance with all of the requirements of 35 USC 112. Accordingly, it is respectfully requested that the amendments to the claims be approved and entered and that the rejection under 35 USC 112, second paragraph, be withdrawn.

PRIOR ART REJECTIONS

Rejection under 35 USC 103

Point 12. Claims 1, 2,and 4-6 were rejected under 35 USC 103(a) as being unpatentable over Zettl et al. (U.S. Pat. No. 6,063,243)

The Examiner's rejection is respectfully traversed on the grounds that Zettl et al do not disclose, teach or suggest all of the features of amended independent claims 1,

In the Office Action, claim 3 is rejected under 35 U.s.c. 103(a) as being unpatentable over Zettl et.al. (6,063,243) and further in view of Bolskar et.al.(US PGPub 2003/0220518 A1).

Claims of the present invention are different and are patentable:

In amended claim 1 of the present invention the features are:

"selecting consumable graphite and non consumable graphite electrodes wherein at least one of said electrode having at least one longitudinal inner channel for delivering of a buffer gas outflow, feedstock material and catalyst to between electrode gap;

creating a radial buffer gas outflow in said gap between anode and cathode in the hot plasma zone;

continuous feeding to the hot plasma zone of the consumable electrode, feedstock material and catalyst admixed with the buffer gas outflow injected through the longitudinal inner channel of the electrode;

forming in the hot plasma zone a vapor from the consumable electrode and consumed materials;

continuing an arc plasma process of carbon allotropes synthesis until anode is consumed"

Said at least one longitudinal inner channel or network of inner channels as shown in Fig.2, 3, 4, 5 and 6 are used for delivering of inert buffer gas outflow to the between electrode gap.

Zettl et.al. (claim 1) claims "providing first and second electrode in the chamber wherein at least one of the electrode has an interior region comprising one or more conduits ,wherein each conduit connect a fluid sources located outside the chamber to a coolant core inside the electrode".

We are considering that present invention teach different purpose.

In our invention, as we are teaching in claim 2, "said continuous feeding of selected electrode, feedstock material and catalyst into the hot plasma zone is performed by moving of at least one consumable electrode towards the said hot plasma zone" and "continuous feeding of selected materials with admixed inert buffer gas comprising helium, mixture of helium with 20% of argon and/or mixture of helium with 10% of nitrogen" (Claim 1, page 9, lines 15-18).

Zettl et.al. (claim 1C) teaches "moving material through a conduit in the first electrode" to the gap and then (claim 3) through a conduit in the second electrode to a region outside the vacuum chamber".

Zettl et.al.claim described on lines 58-67 and addressed by the Examiner teaches moving material such as metals Co, Ni, Yt, gases He and N but Ar through the conduit in the first electrode to the gap and then (claim 3) through the second electrode to a region outside the vacuum chamber.

As the Examiner mentioned, "claim 2 of Zettl's invention does not teach moving the consumable electrode towards the plasma zone, "it would have been obvious to someone of ordinary skill in the art to do so in order to keep a preferable distance in the between electrode gap".

Zettl's invention does not require this motion because they do not have consumed electrode. They need only one time adjustment in the beginning of operational cycle because later on they are moving all material through the conduit.

In contrary in our invention we are using graphite electrodes and they are consumable as the precursor for producing desired product such as fullerenes and carbon nano tubes.

As the Examiner mentioned, "claims 1&5 of Zettl's invention do not explicitly teach a radial gas outflow. The structure of the Zettl's apparatus at arc zone, however, appears to be the same as applicant's, and a similar flow pattern would be expected".

At the same time, objected by the Examiner "radial buffer gas flow" mentioned as entirely not clear term. Inventors disagree with the Examiner opinion

In response, as it is shown on Fig.2, 3, 4, 5, 6 &7, claim 1, and on page 7, lines 13-15 of the specification the invention comprises both consumable and not consumable graphite electrode having at least one longitudinal inner channel for injection of buffer gas into hot plasma zone and creating a radial buffer gas outflow at the exit from cathode in the hot plasma zone (as shown on

Fig. 1). The used electrodes, regarding of the used diameters up to 38 mm (see examples), have flat faces positioned in hot plasma zone and depending on productivity automatically are maintaining between electrodes gap in the range of 1,5-5 mm (see example 1) during the process. In operational stage the next scenario takes place: gas come out from the cathode channel in plasma zone, it hits the flat face of the second electrode, repulses, turn out and travel in radial direction out of the plasma zone (see Fig 1, 3,4 & 5) creating so called radial buffer gas outflow phenomenon. The central longitudinal channel could be branched out at the distal end of electrode with multiple outlet holes of smaller diameter shown on Fig.3, 4 and 5 for better, uniform distribution of buffer gas. Created radial buffer gas outflow is used for forced evacuation of developed carbon vapor from the hot plasma zone to reaction vessel. Radial buffer gas outflow is created by the network of inner channels in the not consumable electrode-cathode but could be created as well in anode body. Subfigures 1a, 1b and 1c depict three possible ways of creating the radial buffer gas outflow in the gap between anode and cathode in plasma zone. Released buffer gas into hot plasma zone from the network of inner channels allows producing of quick uniform mixture with developed carbon vapor in this zone and quick forced evacuation outward to reaction vessel.

The Zettl's method could not benefit from using radial buffer gas outflow because this method comprises injection of material through first electrode to arc zone and then immediate exhaust of the produced product through the second electrode out of reaction vessel.

Zettl's et al. do not disclose, teach or suggest this unique features as " creating a radial buffer gas outflow in the gap between anode and cathode in the plasma zone and continuing an arc plasma process of carbon allotropes synthesis until anode is consumed" as teach amended claim 1 of the present invention. This feature is supported by original specification (see page 4, paragraph 0045) .

The inventors may mention next in response to the last remark of the Examiner in his point 12 note. The main precursor for production of fullerenes and carbon nano tubes is solid graphite-the main body of consumable electrodes. The injected buffer gas is used for developing the efficient mixture of produced carbon vapor in the hot plasma zone, as a main mission, for forced quick evacuation of carbon vapor from the plasma zone outward to reaction vessel for quenching. As the examiner correctly stated the injected buffer gas outflow could be used for feeding other gaseous or powders materials as a second mission.

In view of the arguments presented above, it is respectfully submitted that claims 1-6 patentably distinguish over Zettl' et al, under 35 USC 102 as well as under 35 USC 103. But we recognize the Examiner reference of Bolskar et.al. (US PGPub 2003/0220518 A1), agree with the Examiner position and are canceling this claim 3.

Point 14. Claims 1, 2 and 4-6 were rejected under 35 USC 102 as being anticipated by US PGPub2005/0019245 A1 ("Koulikov"). This rejection, however, is respectfully traversed with respect to the **PETITION TO CLAIM BENEFIT UNDER 35 U.S.C. 119(e) OF PRIOR**

FILED PROVISIONAL APPLICATION No. 60/453,805 filed March 11, 2003 (37 C.F.R. 1.78(a)(6)).

We claimed priority only in the Declaration when Utility application was filed.

It was our mistake.

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SUMMARY

Having fully addressed the Examiner's rejection of all of the claims Applicant submit that the reasons for the Examiner's rejections have been overcome. Applicant respectfully requests that the amendments be entered and Notice of Allowance be issued.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

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Receipt is acknowledged of this provisional Patent Application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

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Non-Publication Request: No

Early Publication Request: No

** SMALL ENTITY **

Title

Method and apparatus for carbon allotropes synthesis

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Title 35, United States Code, Section 184
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